Trend Study 22-12-08

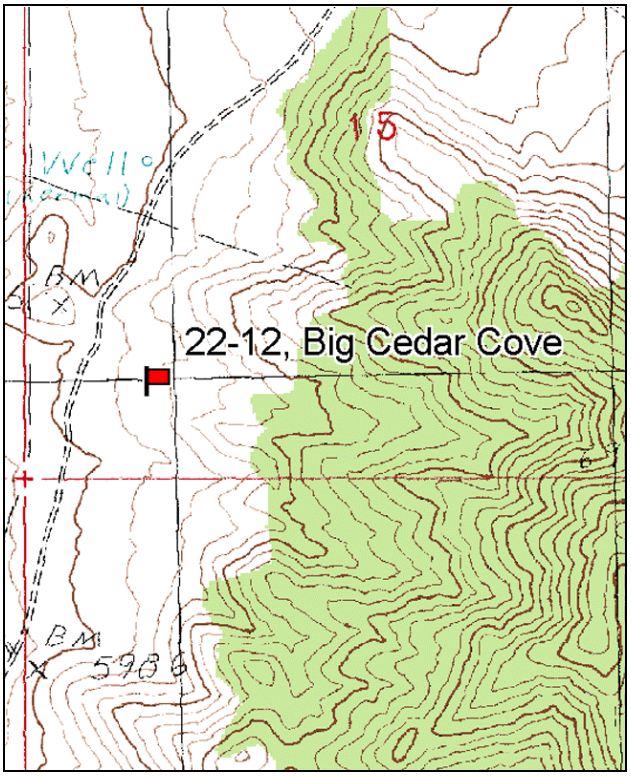
Study site name: Big Cedar Cove . Vegetation type: Big Sagebrush-Grass .

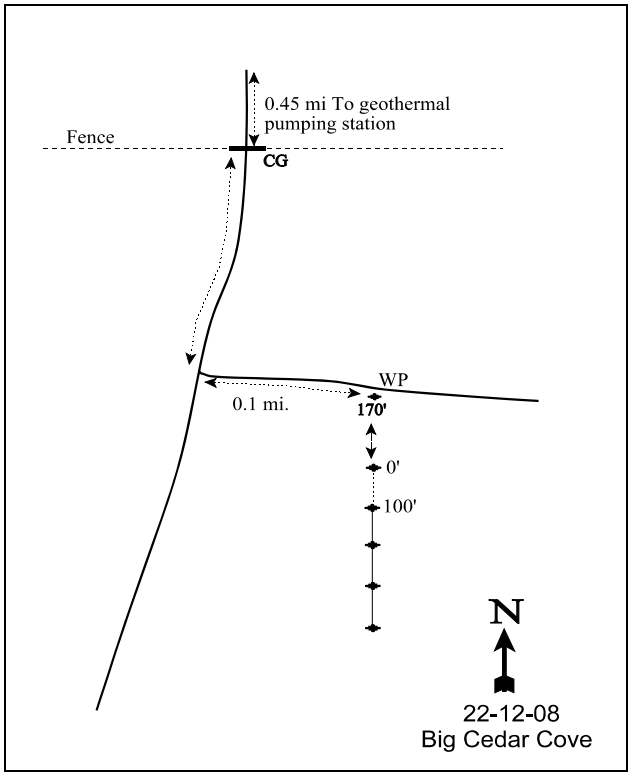
Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From mile marker 4 on SR257 north of Milford, go 0.4 miles north. Turn right at Roosevelt Hot Springs Road (Blundell Geothermal Plant) and drive 2.65 miles to a major fork. Continue straight and go 5.0 miles. Just across the cattleguards turn right and go 1.0 miles to a 4-way fork. Turn right and continue 0.45 miles (past Phillips Oil well-head on the right) to another cattleguard. Go another 0.20 miles to a junction. Turn left and drive 0.1 miles to a witness post. The transect starts 170 feet south of the road. The 0-foot baseline stake is a steel rebar three feet tall with a browse tag #7079 attached.





Map Name: Bearskin Mountain

Diagrammatic Sketch

Township 27S , Range 9W , Section 15

GPS: NAD 83, UTM 12S 337869 E, 4258163 N

DISCUSSION

Big Cedar Cove - Trend Study No. 22-12

Study Information

This trend study is located on the foothills on the west side of the Mineral Mountains [elevation: 6,000 feet (1,829m), slope: 9%, aspect: southwest]. The site is administered by the BLM. The area was dominated by Wyoming big sagebrush sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) until 2007 when the Milford Flat Fire burned across the site. Deer use on the site was light in both 1998 and 2003 at an estimated 12 days use/acre (30 ddu/ha) and 27 days use/acre (66 ddu/ha), respectively. No deer use was sampled in 2008. Livestock use was also light with 6 cow days use/acre (15 cdu/ha) in 1998, and 4 cow days use/acre (10 cdu/ha) in 2003. A geothermal plant is located nearby and has the potential to impact deer in the area through habitat loss and increased disturbance and human activity.

Fire rehabilitation efforts in the fall of 2007 included aerial seeding with mixture of grasses and forbs, followed by chaining with an Ely chain to cover the seed. After chaining was completed, Wyoming big sagebrush was aerially seeded. This study site was close to the border of the mid elevation mix 2 and the low elevation mix 3. Forage kochia (*Kochia prostrata*) was flown onto the low elevation area. There was likely some overlap of seeding in this area as kochia was sampled in 2008.

Milford BLM Mix 2 (Mid Elevation)

Common Name	**Scientific Name**	**Bulk lbs/ac**
Hycrest Crested Wheatgrass	*Agropyron cristatum*	2.1
Bannock Thickspike Wheatgrass	*Agropyron dasystachyum*	1.3
Vavilov Siberian Wheatgrass	*Agropyron fragile*	0.2
Rush Intermediate Wheatgrass	*Agropyron intermedium*	0.8
Arriba Western Wheatgrass	*Agropyron smithii*	1.6
Luna Pubescent Wheatgrass	*Agropyron trichophorum*	1.2
Appar Blue Flax	*Linum lewisii*	0.3
Ladak Alfalfa	*Medicago sativa*	1.0
Yellow Sweet Clover	*Melilotus officinalis*	0.3
Eski Sainfoin	*Onobrychis viciifolia*	2.1
Rimrock Indian Ricegrass	*Oryzopsis hymenoides*	0.8
Delar Small Burnett	*Sanguisorba minor*	2.3
		13.9

Milford Mix 2 Wyoming Sage

Common Name	**Scientific Name**	**Bulk lbs/ac**
Alfalfa 'Ladak'	*Medicago sativa*	0.5
Sagebrush, Wyoming--Beaver UT	*Artemisia tridentata ssp. wyomingensis*	0.5
Total		**1.0**

Soil

The site is within the Mineral Mountain series (USDA-NRCS 2007) which consists of soils formed in deep soil material from alluvium which are very cobbly in character. Soil analysis indicates a sandy loam texture with a neutral pH (6.7). The soil is relatively deep and coarse with nearly half of the soil surface covered with pavement and rocks. Effective rooting depth was estimated at 19 inches in 1998. In 1998, the soil was said to be slightly eroding as it showed signs of sheet erosion. Soils were given a stable rating from an erosion condition class assessment completed on site in 2003 and 2008.

Browse

Prior to the Milford Flat fire this area was dominated by Wyoming big sagebrush and encroaching pinyon (*Pinus edulis*) and juniper (*Juniperus osteosperma*). The fire completely changed the community. Less than one growing season after the Milford Flat fire browse was sparse. A few young and seedling sagebrush plants were sampled. Forage kochia was also sampled with a density of 540 plants/acre. It will still be a few years before it can be determined if the fire rehabilitation efforts were successful.

Herbaceous Understory

Sandberg bluegrass (*Poa secunda*) was the most abundant perennial grass prior to the fire. In 2008, crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*Agropyron intermedium*) were the most abundant (pubescent wheatgrass was lumped together with intermediate for identification purposes). Cheatgrass (*Bromus tectorum*) nested frequency declined after the fire, but was very robust due to reduced competition. Cheatgrass has been very abundant in the past. Hopefully species such as crested wheatgrass, intermediate wheatgrass, and forage kochia will provide competition to keep cheatgrass at a minimum. Three of the forbs that were seeded in the rehabilitation effort were sampled in 2008, alfalfa (*Medicago sativa*), blue flax (*Linum lewisii*) and small burnett (*Sanguisorba minor*).

1991 TREND ASSESSMENT

The key browse species, Wyoming big sagebrush, shows only a slight increase in density (3%), while this is countered by a decrease in recruitment of young, and increased decadence to over 50%. Plants with poor vigor have increased to 39%. These factors all indicate a slightly down trend. The trend for perennial grasses is up with a 60% increase in sum of nested frequency. The trend for perennial forbs is considered stable, even with the slight increase in nested frequency. Overall they are of little value as a source of forage as it contributes to less than 1% cover.

browse - slightly down (-1) grass - up (+2) forb - stable (0)

1998 TREND ASSESSMENT

The browse trend is considered stable. The Wyoming big sagebrush population still exhibits relatively high decadence, but appears to be recovering from poor conditions reported in 1991. The decline in recruitment of young plants is cause for concern. Broom snakeweed density can fluctuate highly depending on precipitation patterns, and this population will likely show great increases and decreases in the future. The trend for perennial grasses is stable as nested frequency value has change very little since 1991. Trend for the perennial forbs decreased somewhat, but they still provide very little forage of any value.

Winter Range Condition (DCI) - fair (40) low-level potential scale
browse - stable (0) grass - stable (0) forb - stable (0)

2003 TREND ASSESSMENT

Trend for browse is slightly down. Wyoming big sagebrush has a fairly stable density, however, counter to this is that recruitment of young is non-existent and decadence is over 50%. Trend for perennial grasses is considered stable even with the slight decrease in sum of nested frequency, but none of the grass species decreased significantly. Trend for perennial forbs is stable as it still does not provide a significant source of forage.

Winter Range Condition (DCI) - fair (30) low-level potential scale
browse - slightly down (-1) grass - stable (0) forb - stable (0)

2008 TREND ASSESSMENT

Trend for browse is down. Wyoming big sagebrush has been lost to the effects of the 2007 wildfire. Forty young plants/acre were sampled in 2008. Trend for perennial grasses is fairly stable considering effects of the

wildfire. Now, with the two new seeded grasses, crested wheatgrass and intermediate wheatgrass, it would appear that the perennial grasses will do well in the future if not overgrazed by livestock in the late spring. The perennial forbs are slightly down but are of such little importance trend would be considered stable.

Winter Range Condition (DCI) - very poor (7) low-level potential scale
browse - down (-2) grass - stable (0) forb - stable (0)

HERBACEOUS TRENDS --
Management unit 22 , Study no: 12

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
G	Agropyron cristatum	a-	a-	a-	a-	b82	-	-	1.35
G	Agropyron intermedium	a-	a-	a-	a-	b104	-	-	1.87
G	Aristida purpurea	b13	b17	b19	b17	a-	.66	.31	-
G	Bromus tectorum (a)	-	-	c308	b284	a64	4.59	4.50	3.15
G	Hilaria jamesii	56	61	65	42	28	1.18	.31	.26
G	Oryzopsis hymenoides	a-	a4	a5	a3	b12	.19	.06	.08
G	Poa fendleriana	-	-	-	-	3	-	-	.00
G	Poa secunda	a68	b116	b137	b140	a28	3.09	2.23	.16
G	Sitanion hystrix	b41	c75	bc68	bc75	a5	1.93	2.40	.06
G	Stipa comata	11	29	14	9	7	.16	.18	.07
Total for Annual Grasses		0	0	308	284	64	4.59	4.50	3.15
Total for Perennial Grasses		189	302	308	286	269	7.22	5.52	3.88
Total for Grasses		189	302	616	570	333	11.81	10.02	7.03
F	Agoseris glauca	3	7	-	4	6	-	.01	.06
F	Alyssum alyssoides (a)	-	-	-	6	4	-	.01	.01
F	Arabis demissa	2	-	2	-	-	.00	-	-
F	Astragalus sp.	-	4	7	-	1	.06	-	.03
F	Castilleja chromosa	-	-	3	-	-	.03	-	-
F	Calochortus nuttallii	1	5	1	-	1	.00	-	.00
F	Chenopodium album (a)	-	-	-	-	3	-	-	.03
F	Crepis sp.	-	4	-	-	-	-	-	-
F	Delphinium nuttallianum	-	5	-	-	-	-	-	-
F	Draba sp. (a)	-	-	a-	b11	a3	-	.02	.00
F	Erodium cicutarium (a)	-	-	-	-	-	-	-	.03
F	Erigeron pumilus	a3	a5	b10	-	2	.59	-	.00
F	Gayophytum ramosissimum(a)	-	-	-	-	-	-	-	.00
F	Gilia sp. (a)	-	-	a-	b26	b21	-	.09	1.12
F	Helianthus annuus (a)	-	-	-	-	5	-	-	.18
F	Hedysarum boreale	-	-	-	-	1	-	-	.03

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
F	Lappula occidentalis (a)	-	-	-	-	2	-	-	.00
F	Linum lewisii	-	-	-	-	3	-	-	.03
F	Lomatium sp.	-	1	2	-	-	.01	-	-
F	Lupinus argenteus	-	-	1	-	-	.00	-	-
F	Mentzelia sp.	-	-	-	-	-	-	-	.03
F	Medicago sativa	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$24	-	-	.11
F	Microsteris gracilis (a)	-	-	1	-	-	.00	-	-
F	Navarretia intertexta (a)	-	-	12	27	7	.05	.08	.02
F	Phlox hoodii	-	-	-	-	3	-	-	.03
F	Phlox longifolia	$_{a}$-	$_{c}$31	$_{bc}$23	$_{a}$9	$_{ab}$10	.11	.01	.05
F	Phlox sp.	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$87	$_{a}$-	-	.47	-
F	Ranunculus testiculatus (a)	-	-	-	3	-	-	.00	-
F	Sanguisorba minor	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$7	-	-	.13
F	Sphaeralcea coccinea	-	-	-	-	-	.00	-	-
F	Zigadenus paniculatus	3	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	13	73	45	0.05	0.21	1.40
Total for Perennial Forbs		12	62	49	100	58	0.83	0.49	0.51
Total for Forbs		12	62	62	173	103	0.89	0.71	1.92

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 22 , Study no: 12

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	Amelanchier utahensis	1	0	0	.00	-	-
B	Artemisia tridentata wyomingensis	87	87	2	16.49	14.27	.00
B	Chrysothamnus viscidiflorus stenophyllus	36	36	3	1.00	1.76	.00
B	Ephedra nevadensis	7	8	0	.74	1.72	-
B	Gutierrezia sarothrae	61	52	1	3.37	3.38	.00
B	Juniperus osteosperma	1	0	0	.00	-	-
B	Kochia prostrata	0	0	17	-	-	.09
B	Leptodactylon pungens	1	6	0	.00	.00	-
B	Opuntia sp.	7	6	0	.00	.00	-
B	Pinus edulis	3	4	0	.58	1.56	-
B	Ribes cereum cereum	1	0	0	.00	-	-
Total for Browse		205	199	23	22.21	22.70	0.10

CANOPY COVER, LINE INTERCEPT --
Management unit 22 , Study no: 12

Species	Percent Cover	
	'03	'08
Artemisia tridentata wyomingensis	16.78	-
Chrysothamnus viscidiflorus stenophyllus	1.14	-
Ephedra nevadensis	1.25	-
Gutierrezia sarothrae	4.46	-
Juniperus osteosperma	.03	-
Kochia prostrata	-	.06
Opuntia sp.	.13	-
Pinus edulis	.73	-

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 22 , Study no: 12

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata wyomingensis	1.3	-

POINT-QUARTER TREE DATA --
Management unit 22 , Study no: 12

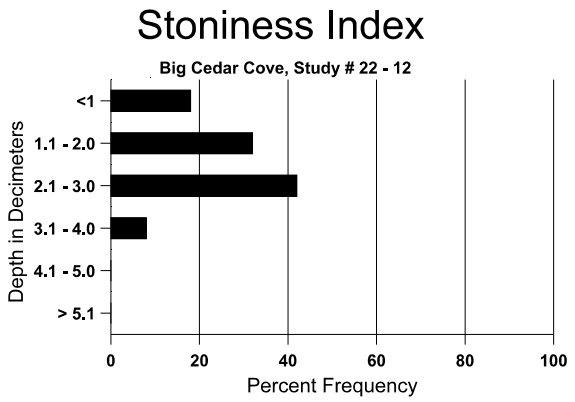
Species	Trees per Acre			Average diameter (in)		
	'98	'03	'08	'98	'03	'08
Juniperus osteosperma	19	21	<18	4.7	5.7	-
Pinus edulis	54	68	<18	2.7	1.7	-

BASIC COVER --
Management unit 22 , Study no: 12

Cover Type	Average Cover %				
	'85	'91	'98	'03	'08
Vegetation	3.00	6.00	31.45	34.36	9.57
Rock	2.00	3.25	5.42	2.76	6.60
Pavement	37.50	35.75	43.72	42.49	57.20
Litter	51.25	42.25	36.46	22.28	5.55
Cryptogams	0	0	1.37	.29	0
Bare Ground	6.25	12.75	13.13	8.24	27.40

SOIL ANALYSIS DATA --
Management unit 22, Study no: 12, Study Name: Big Cedar Cove

Effective rooting depth (in)	Temp °F (depth)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
			%sand	%silt	%clay				
18.8	45.4 (16.7)	6.7	62.7	20.7	16.6	1.8	7.5	96.0	0.6



PELLET GROUP DATA --
Management unit 22 , Study no: 12

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	28	21	3
Deer	21	9	-
Cattle	1	2	-

Days use per acre (ha)		
'98	'03	'08
-	-	-
12 (30)	27 (66)	-
6 (15)	4 (11)	-

BROWSE CHARACTERISTICS --
Management unit 22 , Study no: 12

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**20**	-	-	20	-	-	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	-/-
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia tridentata wyomingensis												
85	**3998**	133	866	1733	1399	-	63	12	35	-	0	21/26
91	**4131**	-	666	1266	2199	-	65	15	53	12	39	17/20
98	**3480**	100	40	2140	1300	600	30	2	37	10	11	22/34
03	**3420**	-	-	1640	1780	440	18	.58	52	25	25	21/34
08	**40**	60	40	-	-	-	0	0	0	-	0	-/-
Chrysothamnus viscidiflorus stenophyllus												
85	**1798**	-	133	999	666	-	37	0	37	-	15	8/10
91	**1464**	-	66	599	799	-	23	5	55	11	50	9/11
98	**900**	-	-	800	100	20	0	0	11	7	7	11/18
03	**900**	-	-	740	160	-	0	0	18	7	7	11/17
08	**60**	-	60	-	-	-	0	0	0	-	0	-/-
Ephedra nevadensis												
85	**265**	-	66	199	-	-	100	0	0	-	0	15/11
91	**532**	-	266	266	-	-	100	0	0	-	0	15/14
98	**320**	40	160	140	20	-	44	25	6	-	25	20/27
03	**200**	20	20	160	20	-	50	20	10	-	10	22/34
08	**0**	-	-	-	-	-	0	0	0	-	0	12/18

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae												
85	**0**	-	-	-	-	-	0	0	0	-	0	-/-
91	**531**	-	133	199	199	-	0	0	37	11	63	9/7
98	**10080**	160	2000	8000	80	80	0	0	1	.39	.39	8/9
03	**5040**	20	-	4320	720	1040	0	0	14	6	21	11/16
08	**20**	20	20	-	-	-	100	0	0	-	0	-/-
Juniperus osteosperma												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**20**	-	20	-	-	-	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	-/-
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Kochia prostrata												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	-/-
08	**540**	100	440	100	-	-	0	0	-	-	0	8/9
Leptodactylon pungens												
85	**66**	-	-	66	-	-	0	0	-	-	0	9/5
91	**199**	-	-	199	-	-	0	0	-	-	0	7/5
98	**20**	-	20	-	-	-	0	0	-	-	0	9/10
03	**160**	-	-	160	-	-	25	0	-	-	0	7/5
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Mahonia repens												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	6/11
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia sp.												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**140**	-	-	140	-	-	0	0	-	-	0	6/10
03	**140**	-	-	140	-	-	0	0	-	-	0	6/18
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Pinus edulis												
85	**66**	-	-	66	-	-	0	0	-	-	0	69/71
91	**66**	-	-	66	-	-	0	0	-	-	0	116/75
98	**60**	-	40	20	-	-	0	0	-	-	0	-/-
03	**80**	-	80	-	-	-	0	0	-	-	0	-/-
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	-/-
08	**0**	20	-	-	-	-	0	0	-	-	0	-/-
Ribes cereum cereum												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**120**	-	-	120	-	-	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	-/-
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-